Freshwater Quality Monitoring Protocol
San Francisco Area Network

Standard Operating Procedure (SOP) # 2

PERSONNEL TRAINING AND SAFETY

Version 1.01

August 2005

REVISION HISTORY LOG

Prev. Version #	Revision Date	Author	Changes Made	Reason for Change	New Version #
1.0	8/05/05	M. Cooprider	Minor edits	Preparation for formal peer review	1.01

Only changes in this specific SOP will be logged here. "Version numbers increase incrementally by hundredths (e.g. version 1.01, version 1.02, …etc) for minor changes. Major revisions should be designated with the next whole number (e.g., version 2.0, 3.0, 4.0 …). Record the previous version number, date of revision, author of the revision, identify paragraphs and pages where changes are made, and the reason for making the changes along with the new version number" (Peitz et al, 2002).

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ACKNOWLEDGEMENTS

The USGS National Field Manual Chapter 9 (Safety) was used extensively (Lane and Fay 1997) during the writing of this protocol. In addition, the Job Hazard Analysis (JHA) from Golden Gate National Recreation Area (Fong et al., 2003) was followed for safety hazards specific to aquatic projects in the Coastal California Mediterranean climate. The Greater Yellowstone Network's Safety and Health SOP (O'Ney 2005) for their long-term water quality monitoring plan was also reviewed for ideas on format and content. The SFAN Water Quality Monitoring Program acknowledges the individuals involved in writing and researching these documents.

1.0 SCOPE AND APPLICATION

Safety and training are included together in a single SOP because they are closely linked. Training for water quality sampling is much more than learning proper equipment use and sampling techniques. Safety and QA/QC are significant components of a long-term water quality monitoring plan. Many safety issues are associated with implementing a long-term water quality monitoring plan that includes extensive field work across multiple parks, with multiple staff in varying environmental conditions. Thorough planning is required to ensure that training and safety requirements are met and that the safety of field personnel is not compromised.

2.0 TRAINING

2.2 Introduction

NPS staff collecting all water quality data and downloading continuous loggers and have either already been trained by other NPS staff or will be trained before plan implementation. Scientists at PORE and GOGA have been conducting water quality related activities for several years and can provide training if necessary to network staff. Current network staff are trained in water quality procedures and can learn additional methods (e.g., use of Hydrolab mini-sondes for continuous measurement) from GOGA and PORE staff.

All technical staff involved in data collection will have education background in biological or physical sciences. The Network Water Quality Specialist (Program Lead) will have specialized experience in water quality or closely related aquatic resource. Where necessary (e.g., with staff turnover, adoption of new methods, etc.) local technical experts (universities/agencies) will be called upon for training assistance. Familiarity with GPS navigation will also be a qualification (or training will be provided). Boater certification will not be needed at this time. Field personnel (network hydrologic technician) will receive training in a variety of discharge (flow) measurement methods (e.g., low flow, high flow bridge-deployed).

Field personnel (Network Hydrologic Technician and other SFAN staff (biological technician/park Americorps crews)) will be evaluated on their field performance during field QA audits conducted by the SFAN Water Quality Specialist, other park aquatic professionals. Field performance audits are recommended every two years, or more often if necessary. If any deficiencies within a crew are noted during this QA audit, they will be documented and remedied prior to continued field sampling. This can be accomplished by additional training or by changing personnel, but verification of correction of any deficiencies must be documented in writing prior to the resumption of further sample collection activities.

2.2 Procedures

1. At least two network or park individuals will be trained in equipment use and sampling techniques, and QA/QC measures. This will help ensure continuity should one person leave a position or otherwise not be available for a particular sampling event. In addition, it will be mandatory that two field staff be present for sampling during storm events and it is recommended at other times as well.

2. Staff will be trained through review of written guidance plus a series of sampling events. The overall project purpose, protocols, equipment manuals, and field maps will be reviewed before commencing fieldwork. The first sampling event (or first group of sites in an event) will be used to demonstrate the sampling process including QA/QC (see SOP #4 – QA/QC SOP). The second sampling events or group of sites will give the trainees an opportunity to sample with guidance. The trainer (Network Physical Scientist) will periodically accompany the recently trained individuals to ensure that the protocol continues to be followed and to address any questions.

3. Ensure that all field personnel obtain First Aid and CPR training. This is also highly recommended for office personnel.

4. Supervisory staff should ensure that all field staff are well trained in the safety guidelines and policies outlined below.

3.0 SAFETY

3.1 Introduction

Safety is "the condition of averting or not causing injury, danger, or loss" (Lane and Fay, 1997). As a Federal employee, you are required to know and follow safety policies and requirements. The USGS National Field Manual (NFM) provides background information on safety policies from the Department of Interior (DOI), the Occupational Safety and Hazard Act (OSHA), the Environmental Protection Agency (EPA), and the Department of Transportation (DOT). The USGS National Field Manual extensively covers all of the topics below:

→Safety Policies, Regulations, and Requirements
→Field trip preparations and emergency contacts*
→Transportation*
→Surface water activities*
→Groundwater activities
→Chemicals*
→Contaminated Water*
→Environmental Conditions*
→Animals*
→Plants *
→Checklist of Safety Equipment*

The asterics (*) denote topics that are covered here since they are most pertinent to the current SFAN water quality monitoring protocol. This SOP will also individually address potential safety hazards by focusing on an existing Job Hazard Analysis created for the aquatics program at GOGA. Consult the NFM at http://water.usgs.gov/owq/FieldManual/Chap9/content.html for complete recommended safety procedures. This document is included in the appendices and should be readily available as a reference in the field.

Plants
The USGS National Field Manual, Chapter 9 provides a thorough summary of field hazards. Some of the most common health hazards within SFAN include poison oak and stinging nettle. The safety briefing "Working in Poison Oak" (Brands-Maloney, 2001) provides an extensive review of poison oak identification, location, prevention, and treatment of contact dermatitis and is included in the appendix. Field personnel should review this BEFORE entering the field. Be familiar with the shape, color, and size of poison oak leaves twigs, vines, and, yes, shrubs. Stinging nettle is not a health threat but causes skin irritation which can be severe (though temporary) if in large amounts.

Animals and disease vectors
Although rare, large predators such as mountain lions inhabitat some of the areas within the parks. Though some of these hazards are rare, it is important to be aware of all of them. Rattlesnakes may also occur but rarely near riparian areas where sampling will occur. Local information about ticks and lyme disease is also included in the appendix. West Nile Virus, a

more recent concern, is transmitted by mosquitos. Though not a major threat, it is important to be aware of this virus. Only a few species of mosquitos carry the virus and fewer are infected. Another issue to be aware of is hantavirus which is spread through rodent feces and normally a concern indoors, or garages, or other areas where equipment may be stored. As with all hazards, consult the USGS National Field Manual for details.

Inclement Weather and Surface Water Activities
Sampling during storm events is of particular concern in Mediterranean climates. Most, if not all, of the streams in the SFAN are "flashy", meaning that water level rises rapidly during a storm event. For example, individuals taking flow measurements in Chalone Creek (PINN) have had to end flow measurements since the stage rose to an unsafe level during the short time that the velocity measurements were being taken. Do not attempt to wade a stream for which values of depth multiplied by velocity are greater than or equal to 10 ft^2/s. During high flows use of a wading belt is recommended to avoid the waders filling with water. Any time chest waders are worn, a life jacket is required.

Other potential hazards to be considered at all parks include flowing logs and other debris, quicksand (particularly at PINN), falling trees, drowning, falling, back injuries from lifting/bending/falling. A thorough list of hazards is particularly useful for staff who may not be familiar with the local weather and climate, topography, flora, or fauna. A good summary of these hazards is provided in the Job Hazard Analysis (JHA) for Aquatic Projects (Fong et al, 2003) in the Appendix.

Contaminated Water
Waterborne pathogens include typhoid, tetanus, hepatitis, polio, and rabies. Excess quantities of E. coli can cause gastrointestinal problems but are usually less severe than the previously mentioned pathogens. Never drink water straight from a creek. Water being sampled may be contaminated with pathogens or harmful chemicals. Use extra precautions when working with water that is known to be contaminated. Some precautions include not eating or drinking while sampling and not putting objects such as pencils in your mouth. In particular, keep hands away from nose, ears and mouth (this also helps reduce spreading of poison oak). Wash hands thoroughly before eating. If no soap and water are available, use of an antibacterial hand cleanser is highly recommended.

Chemicals
Some potentially hazardous chemicals are required for cleaning of water quality instruments. Chemicals become hazardous when they are used improperly or care is not taken. Know the location of Materials Safety Data Sheets (MSDS) and consult these BEFORE using any chemical. Also, know the storage requirements and proper location for the chemical.

Transportation
Safety considerations for vehicles used to reach sampling sites are covered in the attached JHA. Most of us drive a vehicle regularly and may not always think about the hazards associated with it. It is very important to inspect the vehicle before leaving. Ensure that safety equipment is in the vehicle. During driving to and from sampling areas it is particularly important to consider issues such as nightime driving and fatigue, storms, road flooding, driving in (initially)

unfamiliar areas and remote areas where large animals may be crossing the road. Additional details regarding transporation safety procedures and policies are listed in the USGS National Field Manual.

Environmental Hazards and General Emergency Information
Individual parks have occupant emergency plans which cover safety procedures for medical emergencies, earthquakes, floods, fires, bomb threats. Be familiar with the procedures and emergency contact numbers of your duty station park as well as other parks you may visit during field sampling activities. Overall, be aware of your environment, use common sense, do not exceed your limits (for example, operation of equipment; lifting heavy objects and equipment; physical tolerance to exertion, heat, and cold), and trust your instincts (Lane and Fay, 1997).

3.2 Procedures for Safety Preparation

Adapted from the California Water Resources Control Board Surface Water Ambient Monitoring Program (SWAMP) Appendix H of the Quality Assurance Management Plan (Puckett, 2002).

Basic planning is required before each field sampling event. A large component of the planning effort involves gathering safety information and documenting all aspects of field sampling trip plans. A trip plan should be completed. One copy should be left at the office and additional copies should be given to field personnel involved in the trip. The trip plan should contain the following information:

- Destination information (parks, streams/sites)
- Field trip participants including guests and observers along with emergency contact information for each
- Estimated departure and return times and dates
- Lodging information and contact phone numbers when traveling overnight
- Vehicle information (make and model of vehicle to be used)
- Phone numbers for mobile phones or park radio frequencies
- Contact number of staff at destination park (if applicable)
- Dispatch phone numbers for each park

The trip plan is a valuable tool in the overall trip planning process. In addition, the plan provides valuable information for other staff not participating in the trip (who may assist you should an emergency occur). Other safety preparations include:

- Check the weather and be aware of changing weather conditions and potential for storms, floods and landslides.
- Carry basic safety equipment (first aid kit, flashlight, boots, rain gear, and antibacterial hand cleanser)
- Carry the USGS NFM Ch.A9, basic first aid protocols, emergency phone numbers and Material Safety Data Sheets (if applicable)
- Collect and update emergency contact information prior to the field season
- Consult the safety checklist in this SOP as well as the equipment checklist in SOP #3 before each sampling event

♦Note and discuss potential hazards at each site with field staff

Requirements for All Field Personnel:

1. At least two network or park individuals will be trained and introduced to all potential safety hazards. This will help ensure continuity should one person leave a position or otherwise not be available for a particular sampling event.
2. It will be mandatory that two field staff be present for sampling during the winter (high flows) and it is highly recommended at other times as well.
3. Staff will review the attached Job Hazard Analysis (JHA) adapted from the GOGA JHA for Aquatic surveys and projects. The USGS National Field Manual will be available for, and reviewed by, all staff.
4. A tetanus shot is required for field personnel.
5. As indicated in the training section, all field personnel should be certified in CPR and First Aid.

3.3 Forms

Complete for each park:

3.3.1 **Emergency Contact Form** (from USGS National Field Manual, Ch. A 9)

Personal contacts

Name: Phone: (home) (work)_____

Name: Phone: (home) (work)_____

SFAN contacts

Golden Gate National Recreation Area _____

John Muir National Historic Site _____

Pinnacles National Monument _____

Point Reyes National Seashore _____

Local emergency contacts (or call 911)

Hospital Phone:_____

Address:_____

Other medical facility (24-hour care) Phone:_____

Address:_____

Police_____

Fire_____

Utility_____

Health Information Centers

Center for Disease Control_____

Information Hotline: _____

Fax: Disease Directory: _____

Other_____

_____

3.3.2 Medical Information form for Office Personnel (USGS National Field Manual, Ch. A9)

Medical Information for Office Personnel

Employee name: _____ Home phone: _____

Treatment preference: medical _____ other (specify) _____

Doctor: _____ Phone: _____

Other emergency contact: _____ Phone: _____

Allergies and other medical conditions	Medications being taken	Medications to avoid

Relevant medical history:

Allergies and other medical conditions:

Special instructions:

Figure 9-2. Example of medical information form to be completed and taken on field trips.

3.4 Checklists for Standard Safety Equipment

Checklists are helpful for ensuring that personnel have the appropriate safety equipment available during field trips. Each study team needs to consider the specific needs for their work and should customize these checklists as necessary.

Safety Equipment Checklists

√	**Climatic and UV protection, etc.**
	Boots
	Fluids (for example, water and sports drinks)
	Hat, wide-brimmed
	Insect repellent (unscented)
	Rain gear
	Sunglasses
	Sunscreen
	Antibacterial soap or hand lotion
	Temperature-modifying clothing

Items for Vehicles

√	**Flotation and reflective protection**
	Orange flotation vests and jackets
	Safety harness

√	**Chemical protection and storage**
	Chemical spill kit
	Eye wash kit (replace old or expired wash solution)
	Material Safety Data Sheets (MSDS)
	Chemical reagents (stored in appropriate area)
	Flammable solvents (stored in appropriate dedicated area)
	Pressurized gases (stored in appropriate area)

√	**Communications and instructions**
	Field folder (including maps, emergency phone numbers for medical facilities, office contacts, family contacts)
	Cellular phone/communication equipment (check that the service is operational for the area to be traveled)

√	**First aid and protective equipment**
	Complete change of clothes (stored in dry area)
	Fire extinguisher (safely secured)
	First aid kit and manual (check for missing or old, expired items and replace if necessary)
	Orange reflective vest

√	**Miscellaneous equipment**
	Bungie cords (to secure loose articles)
	District flood plan (most current version)
	Flagging
	Flares
	Flashlight (including fresh batteries)
	Flexible hose (to vent exhaust away from vehicle)
	Safety cones
	Tool kit
	U.S. Geological Survey TWRI Book 9 Chapter A9.

4.0 REFERENCES

Brands-Maloney, C. 2001. Working in Poison Oak. Point Reyes National Seashore Safety Briefing. U.S. Department of Interior, National Park Service.

Fong, D., B. Holden, D. Anderson. 2003. Golden Gate National Recreation Area Job Hazard Analysis for Aquatic Surveys and Projects. Golden Gate National Recreation Area and Redwood National Park. U.S. Department of Interior, National Park Service.

Lane, S.L., and Fay, R.G., October 1997, Safety in field activities: U.S. Geological Survey Techniques of Water-Resources Investigations, book 9, chap. A9, accessed __*date*__ at http://pubs.water.usgs.gov/twri9A9/

O'Ney SE. 2005. Safety and Health, Version 1.0, Standard Operating Procedure #3. *In* Regulatory Water Quality Monitoring Protocol, Version 1.0, Appendix E – SOPs, National Park Service, Greater Yellowstone Network. Bozeman, MT. 37 pp. plus appendices.

Peitz, D.G., S. G. Fancy, L. P. Thomas, and B. Witcher. 2002. Bird monitoring protocol for Agate Fossil Beds National Monument, Nebraska and Tallgrass Prairie National Preserve, Kansas. Prairie Cluster prototype monitoring program. Version 1.00, September 6, 2002.

Puckett, M. 2002. Quality Assurance Management Plan for the State of California's Surface Water Ambient Monitoring Program ("SWAMP"). California Department of Fish and Game, Monterey, CA. Prepared for the State Water Resources Control Board, Sacramento, CA. 145 pages plus Appendices.

Appendix A

Job Hazard Analysis for Aquatic Surveys and Projects
Note: no all hazards apply to water quality monitoring

Job Hazard Analysis
GOGA

U.S. Department of Interior National Park Service	WORK PROJECT/ACTIVITY **Aquatic surveys and projects**	LOCATION **Golden Gate National Rec. Area**	UNIT **Nat'l Resource Mngt and Science**
JOB HAZARD ANALYSIS (JHA)	DEVELOPED BY **Darren Fong (GOGA)** **Baker Holden III / David Anderson (REDW)**	JOB TITLE **Aquatic Ecologist** **Fishery Biologist**	DATE PREPARED **Revised 28 May 2003** **18 June 2001**

APPROVED BY: DATE:

Required and/or Recommended Personal Protective Equipment:

Sturdy work boots	Life Preserver
Warm clothing / hat	Felt sole waders (chest, hip, neoprene)
Sun hat	Felt sole wading boots
Sun glasses	Cotton gloves / wool gloves
Sunscreen	Linesman gloves
Personal water bottles	Latex gloves
First Aid Kit	Survivor kit
Park radio	Polarized sunglasses
Technu (poison oak cleanser)	Maps
Forceps / vial	Mask and snorkel / neoprene gloves
Safety glasses	

TASKS/PROCEDURES	HAZARDS	ABATEMENT ACTIONS Engineering Controls*Substitution*Administrative Controls* Personal Protection Equipment
All Tasks and Procedures	**Unfamiliarity**	**All people (permanent, seasonal, VIPs) involved in any project should receive a general orientation and tailgate safety session specific to the task prior to beginning of work.**
1. Driving to and from remote field sites.	1a. Narrow, single-lane roads with bumpy or "washboard" surfaces;	WEAR SEATBELTS AT ALL TIMES WHEN VEHICLE IS MOVING 1a. Maintain a safe speed (this if often below the legal speed limit) for the road conditions; stay clear to the right, especially on curves, *drive with headlights on at all times*;

		when turning around on mountain roads always “face the danger” (versus backing toward the cliff edge, e.g.); the passenger should get out and spot for driver when backing up;
	1b. Driving with limited visibility;	1b. Maintain windshield cleaner fluid level and clean both sides of windows regularly (remember back window); *slow down*; if blinded by sun or dust, proceed slowly or pullover and wait for hazard to pass; keep to the right hand side of the road and drive with your *lights on*;
	1c. Sharp rocks on edge or in middle of road;	1c. Get out and move sharp rocks out of the way, reduce speed substantially in places with large amounts of rockfall; make sure tires are properly inflated and check tread and walls regularly for damage; make sure tire jack fits the vehicle and all parts are in the vehicle;
	1d. Large animals crossing or standing in roads (including park bypass);	1d. Slow down where animals might be present to allow for reaction time; do not swerve abruptly to avoid hitting an animal, if necessary it’s better to ride out the impact;
	1f. Fatigue at night and after a long shift in the field;	1f. Be aware of signs of fatigue- pull over and rest! Take a short catnap or eat a snack or have a partner drive; do not take chances by continuing to drive; communicate with your field partner;
	1g. Storm conditions – wind, lightning, muddy/ slippery roads;	1g. Keep informed on the current weather- check www.weather.com or www.wrh.noaa.gov; if winds exceed 15 mph, or the excessive wind category on Beaufort scale (tree tops swaying, twigs and leaves falling, etc.), do not travel into the field; avoid going to the field if lightning is present and avoid using radios; drive slowly when roads are muddy and slippery or snow covered, check with geologists if you are uncertain of back road conditions; avoid wet clay roads as much as possible, these roads can fail after storms, especially in spring, *maintain a slow speed when driving on these roads!;* if you damage waterbars make sure you repair them immediately;
	1h. Fallen trees on road;	1h. For small trees, try and remove tree or cut with a handsaw and remove portion of tree; for large trees, notify support crew to remove tree;

	1i. Others driving on the road;	1i. Do not assume you are the only one on the road behind locked gates (day or night), people from other agencies use these roads; be alert to the idea that others may be coming in from the field in the early a.m. - *drive slow and keep right*!; if you encounter an unusual situation, contact your partner to inform and notify the supervisor or park ranger- avoid confrontational situations with visitors- let the rangers handle it!
2. Communication	2a. Unable to reach a radio repeater in a remote location.	2a. Make sure radio is charged- try to raise someone on the radio to inform them of your predicament; if you are unable to reach a repeater from your location climb up slope toward a ridgetop or knoll and try again; try at regular intervals, just meandering around may help in getting a signal; use cell phone in vehicle (if available), as this may be more reliable for communication in remote locations.
3. Hiking	3a. Steep, rugged, and slippery terrain	3a. Assess terrain conditions to find safe route and modify sampling plans to avoid unsafe areas; Proper footwear is VERY important- wear boots with Vibram or other slip-resistant soles with tops well above the ankle, broken in before the field season, plus 2-3 pairs of cotton or wool socks, NO TENNIS SHOES; if wearing wading boots be cognizant that they are slippery on grass and mud, carry supplies in backpack, make sure pack is comfortable and secure, waist belt recommended; take care when walking on hardwood leaf litter and on wet ground; maintain an erect posture when contouring steep slopes; avoid walking below another person due to the potential for rocks to dislodge from above; use caution when crossing large and/or wet logs.
	3b. Undergrowth	3b. Wear safety glasses (or other glasses) when hiking in brushy areas to protect eyes from protruding objects.
4. Encountering noxious plants, animals, disease, and people	4a. Poison oak	4a. Make sure you can identify poison oak in all its growth forms, foliage, bare twigs, and berries (the plant is toxic in winter when foliage is absent!); apply barrier cream to prevent exposure; wear long sleeves or Tyvex suit (or comparable); avoid sitting with arms resting on knees; use Technu (or something similar) lotion to prevent exposure; wash with Technu soap immediately after returning from the field; bring an extra set of clothes and shoes to change into after coming out of

		field; wash field clothes separately from other laundry.
	4b. Bees/Wasps/Hornets	4b. Determine if any field crew are allergic to bee stings. Notify other crew members and the supervisor if you know you are allergic to bee stings. Ensure that individual carries prescribed medication to prevent anaphylactic shock; Carry a bee sting kit or Benadryl or other antihistamine; Be aware of the ground where you step- some hornets build nests in the ground at the base of trees or shrubs, or in rotten logs- watch for bees buzzing in and out of holes or around ground level; if possible, flag a nest so future surveyors won't run into it;
	4c. Ticks	4c. Know how to identify and distinguish the "deer tick" that carries Lyme disease, from the "wood tick" that does not; if bitten by a tick, remove it (grasp tick with tweezers at head and pull straight out), and follow instructions for preserving it and turn it in to the county health department so they can determine if it was carrying Lyme; fill out a CA-1 (accident report) in the event that symptoms of Lyme disease appear eventually;
	4d. Scorpions	4d. Inspect items left lying on the ground, e.g., clothing, for scorpions prior to putting them on;
	4e. Rattlesnakes	4e. Avoid rattlesnakes by inspecting the ground near logs before stepping over them; avoid placing hands on rock ledges or other natural hoists without visually inspecting them first; in the unlikely event you're bitten by a rattlesnake, stay calm, sit still, and call and wait for help;
	4g. Mountain lions	4g. Avoid mountain lions; if you encounter a lion that doesn't run from you- leave the area; if attacked- fight back!
	4h. Disease (bubonic plague and Hanta Virus)	4h. Stay away from dead rodents and rodent feces, especially in closed buildings.
	4i. Encounters with	4i. Report uncomfortable encounters with strangers in the park to a supervisor

	strangers	as soon as possible; report apparent illegal activity to a park ranger, do not get into a confrontation with visitors in the park.
5. Exposure to environmental variables	5a. Treatment of general injuries	5a. All NPS field staff and contractors will be required to have current First Aid certification.
	5b. Hypothermia	5b. Always anticipate bad weather and dress accordingly, or carry warm clothes with you. Always travel in pairs as a minimum. Keep clothing as dry as possible. Eat high energy nutritional supplements between meals. Cover the head and neck to prevent heat loss. Keep active to maintain the body's metabolism. Drink plenty of liquids to prevent dehydration, although an individual does not "feel" thirsty. Drink warm liquids not cold. Understand the effects of cold and wind: most hypothermia cases develop between 30°F and 50°F.
	5c. Hyperthermia	5c. Hyperthermia may occur during high temperatures, monitor for dehydration, heat exhaustion, heat cramps, and heat stroke; symptoms include nausea, headache, and flushed, red skin; drink plenty of water (even when you are not thirsty); as heat increases, take frequent breaks in cool locations; wear a light shirt.
	5d. Giardia	5d. Giardia is caused by drinking contaminated water- carry plenty of water on outings. Consider all streams contaminated.
	5e. Sunburn	5e. Much of the work takes place in full sunlight (estuary seining, snorkeling, etc.) so prevent sunburn, use 15+ or greater SFP sunscreen and lip balm; and wear a hat, sunglasses, and shirt.
6. General work in or near streams	6a. Working near unstable, steep, deep channels, swift flows.	6a. Reconnoiter to familiarize yourself with stream and reach adjacent to project. Know the current and projected flow conditions from weather forecasts and stream gauge info. Familiarize yourself with work area prior to fieldwork. Review maps and aerial photos to determine access points, reference points, and potential evacuation points. Develop evacuation plans for remote stream sites and make sure you sign out (including location) on the checkout board prior to leaving for the field.
	6b. Giardia	6b. Refer to 5d.
	6c. Sunburn	6c. Refer to 5e.

	6d. Undergrowth	6d. Refer to 3b.
7. Aquatic surveys, Water Quality/Flow Sampling, Culvert Surveys, Spawning/Carcass Counts, Habitat Monitoring, Frog Surveys, Fish Distribution Study, Habitat Improvement Design and Layout, and Project Monitoring	7a. Wading/walking in and across streams	7a. Wear proper waders, felt-soled, chest or hip boots for conditions. When using waders, wear wading belt or similar. Purchase and use waders with felt soles or retrofitted with anti-slip devices. In cold weather, wear neoprene waders or wear warm, preferably polyester garments with standard waders. Use walking stick to improve stability in current. Walk slowly and carefully. Work in teams of two or more and within sight of one another. Cross-stream at shallow riffles, and avoid deep, swift areas. Consult weather forecast each morning or call local observer to determine stream and flow conditions. Avoid wet logs and slippery rocks. Sign out/in at board in front office each day. All people must be CPR and First Aid Certified. Carry a means of communication (e.g., cell phone or radio).
	7b. Wading/walking in and across aquatic sites	7b. Refer to 7a. When wading in aquatic sites with deep, fine sediments, test fine sediment depths with wading rod before entering. Do not enter when fine sediment depths extend above knee.
	7c. Crossing Debris Jams	**7c. Determine the safest route along the creek; either climbing around on either side of the banks, or by going under and/or on top of the jam. When crossing you should be in sight of your coworkers in case anything should occur. Free both hands to assist with climbing jams. If crossing under and/or on top of the jam, be cognizant of its structural integrity. Walk or crawl on the larger key pieces/logs in the jam as smaller woody pieces are more prone to shift, break, or completely give way. Usually, the larger pieces are the most stable and structurally sound. The same is true for any handholds you may use when climbing the jam. If unsure, do not put all your weight on a piece at once, be slow and maintain your handholds if possible. Avoid slick wet logs without bark and if cold, be aware of ice that may be on their surfaces. DO NOT JUMP onto log pieces.**
	7b. Hypothermia 7c. Giardia 7d. Sunburn	7b. Refer to 5b. 7c. Refer to 5d. 7d. Refer to 5e.
8. Boats (non-motorized)	9a. Drowning	9a. Wear proper boating protective/floatation gear (life vests, water-repellent clothing) at all times. Use boats ONLY if trained and knowledgeable in boat use. Work in pairs or teams. Consult flow

		gauge to determine stream safety level.
	9b. Capsizing	9b. Watch out for large organic debris (sweepers) in the channel. Scout unfamiliar obstacles before paddling through. Balance the weight in the boat. Be cognizant that a boat can be easily tipped by shifting your weight.
	9c. Hypothermia	9c. See 5a.
10. Electrofishing	10a. Electrocution	10a. Wear proper chest waders, felt-soled shoes "Without Any leaks" and polarized glasses. Wear linesmen gloves "Without Any leaks". Do not put hands in water when shocker is on (even if wearing gloves). Crew should discuss field methods, safety procedures, and communication prior to beginning electrofishing. Personnel with heart condition (e.g., pacemaker) should not participate. All people must be CPR and First Aid Certified.
11. Snorkel dive fish counts	11a. Snorkeling, swimming, negotiating rapids (Drowning and blunt force injuries)	11a. Divers must be able to swim well in swift water. Divers should work in pairs or teams. Wear wetsuits, including hood and gloves and mask and snorkel. Fins or wading boots are appropriate depending on depth and length of reach. Do not attempt to swim over rapids, falls, or cascades; or under logs, ledges, or boulders. Exit stream and walk around these hazards. On extended multi-day trips, carry adequate first aid, warm clothing, camping gear, radio, and food in float bags. Know and respond quickly to hypothermia or heat stress signs. Use surfer earplugs to protect ears from extended wetness. All people must be CPR and First Aid Certified. Review maps and aerial photos to determine access points, reference points, potential evacuation points. All crewmembers should know potential evacuation points. When diving, crews should be cognizant they may be exposed to giardia. Do not dive in areas known to have water quality risks.
	11b. Hyperthermia 11c. Giardia 11d. Sunburn	11b. Refer to 5b. 11c. Refer to 5d. 11d. Refer to 5e.

JHA Instructions

The JHA shall identify the location of the work project or activity, the name of employee(s) involved in the process, the date(s) of acknowledgment, and the name of the appropriate supervisor approving the JHA. The supervisor acknowledges that employees have read and understand the contents, have received the required training, and are qualified to perform the work project or activity.

Identify all tasks and procedures associated with the work project or activity that have potential to cause injury or illness to personnel and damage to property or material. Include emergency evacuation procedures (EEP).

Identify all known or suspect hazards associated with each respective task/procedure listed. For example:

- **a. Research past accidents/incidents.**
- **b. Research the Health and Safety Code, or other appropriate literature.**
- **c. Discuss the work project/activity with participants.**
- **d. Observe the work project/activity.**

Emergency Evacuation Instructions

Work supervisors and crewmembers are responsible for developing and discussing field emergency evacuation procedures (EEP) and alternatives in the event a person(s) becomes seriously ill or injured at the worksite.

Be prepared to provide the following information:

- **a. Nature of the accident or injury (avoid using victim's name).**
- **b. Type of assistance needed, if any (ground, air, or water evacuation).**
- **c. Location of accident or injury, best access route into the worksite (road name/number), Identifiable ground/air landmarks.**
- **d. Radio frequencies.**
- **e. Contact person.**
- **f. Local hazards to ground vehicles or aviation.**
- **g. Weather conditions (wind speed & direction, visibility, temperature).**
- **h. Topography.**
- **i. Number of individuals to be transported.**
- **j. Estimated weight of individuals for air/water evacuation.**

e. A combination of the above.

Identify appropriate actions to reduce or eliminate the hazards identified. Abatement measures listed below are in the order of the preferred abatement method:

a. Engineering Controls (the most desirable method of abatement). For example, ergonomically designed tools, equipment, and Furniture.

b. Substitution. For example, switching to high flash point, non-toxic solvents.

c. Administrative Controls. For example, limiting exposure by reducing the work schedule; establishing appropriate procedures and practices.

d. PPE (least desirable method of abatement). For example, using hearing protection when working with or close to portable machines (chain saws, rock drills, and portable water pumps).

e. A combination of the above.

Copy of the JHA as justification for purchase orders when procuring PPE.

The items listed above serve only as guidelines for the development of emergency evacuation procedures.

JHA and Emergency Evacuation Procedures Acknowledgment

We, the undersigned work leader and crewmembers, acknowledge participation in the development of this JHA (as applicable) and accompanying emergency evacuation procedures. We have thoroughly discussed and understand the provisions of each of these documents:

SIGNATURE	DATE	SIGNATURE	DATE

Appendix B

Working in Poison Oak – Safety Briefing
(hardcopy only)